

CLAIM AMENDMENTS

Please amend claims 21, 36 and 45, cancel claim 26 and add claims 46-54.

Claims 1-20. (Cancelled)

21. (Currently amended) A process condition monitoring device comprising: a substrate having a first perimeter, the substrate comprising sensors to measure the processing conditions of the substrate at different areas of the substrate; and an electronics module having a second perimeter that encloses the same or less area than the first perimeter, the module comprising:

signal acquisition circuitry coupled to an output of the sensors;
data transmission circuitry coupled to the signal acquisition circuitry;
a power source; and

leads connecting the substrate to the electronics module for transmitting signals between the substrate and the electronics module, the leads providing a flexible connection that allows relative movement between the substrate and the electronics module; and

a remote data processing system, and wherein the data transmission circuitry comprises a wireless transceiver to transmit the processing conditions to the remote system.

22. (Original) The monitoring device of claim 21 wherein the signal acquisition circuitry is configured to amplify an output signal of the sensors.

23. (Currently amended) The monitoring device of claim 21 wherein the data transmission circuitry electronics module comprises a micro-controller and is configured to process correct the output signal using sensor calibration coefficients.

24. (Original) The monitoring device of claim 22 wherein the signal acquisition circuitry is further configured to provide an input signal to the sensors.

25. (Original) The monitoring device of claim 24 wherein the input signal comprises input power.

26. (Canceled)

27. (Original) The monitoring device of claim 22 wherein the data transmission circuitry comprises an analog to digital converter.

28. (Original) The monitoring device of claim 21 wherein the data transmission circuitry comprises memory, and wherein the data transmission circuitry stores processing conditions in the memory.

29. (Currently amended) The monitoring device of claim 21 wherein the remote system is configured to process adjust the output signal using calibration coefficients to provide a final output value.

30. (Original) The monitoring device of claim 21 wherein the transceiver transmits and receives RF signals.

31. (Original) The monitoring device of claim 21 wherein the transceiver transmits and receives IR signals.

32. (Original) The monitoring device of claim 21 wherein the transceiver transmits and receives sonic signals.

33. (Original) The monitoring device of claim 21 wherein the data transmission circuitry comprises one or more connectors to couple a remote system to the device with a communications cable.

34. (Original) The monitoring device of claim 26 wherein the remote system is a microprocessor controlled device.

35. (Original) The monitoring device of claim 21 wherein the processing conditions measured by the sensors comprise one or more of the following conditions: temperature, pressure, flow rate, vibration, ion current density, ion current energy, and light energy density.

36. (Currently amended) The monitoring device of claim 21 wherein the flexible cable is leads from a ribbon cable.

37-44. (Cancelled)

45. (Currently amended) The process condition monitoring device of claim 21 wherein in a first position the electronics module is above or below the substrate, and in a second position the electronics module and the substrate are displaced from each other such that the first and second perimeter do not intersect.

46. (New) The process condition monitoring device of claim 45 wherein, in the first position both the electronics module and the substrate are held by one or more robot hands and in the second position the substrate is within a chamber and the electronics module is outside the chamber.

47. (New) A process condition sensing wafer and data analysis system, comprising:

an instrumented substrate having sensors that output sensor signal data; a data processing system that processes the sensor signal data that is output by the sensors;

an electronics module that moves independently of the data processing system, the electronics module receiving the sensor signal data from the instrumented substrate, the electronics module subsequently passing the sensor signal data to the data processing system; and

a physically continuous flexible connection between the electronics module and the instrumented substrate, the connection allowing relative movement of the electronics module with respect to the instrumented substrate.

48. (New) The process condition sensing wafer and data analysis system of claim 47 wherein the electronics module has a memory unit and the sensor signal data are stored in the memory unit prior to the electronics module passing the sensor signal data to the data processing system.

49. (New) The process condition sensing wafer and data analysis system of claim 47 wherein the sensor signal data pass from the electronics module to the data processing module over a wireless connection.

50. (New) The process condition sensing wafer and data analysis system of claim 47 wherein the instrumented substrate has a physical dimension that is equal to the physical dimension of a semiconductor wafer, printed circuit board or flat panel display substrate and the electronics module has a physical dimension that is equal to or less than the physical dimension of the instrumented substrate.

51. (New) The process condition sensing wafer and data analysis system of claim 47 wherein the instrumented substrate is placed in a process environment and the electronics module is placed outside the process environment.

52. (New) A method of sensing and analyzing process conditions in a process environment, comprising:

generating sensor signal data using one or more sensors attached to a substrate within the process environment;

sending the sensor signal data from the sensors to an electronics module that is attached to the substrate by a flexible cable that allows the electronics module to be displaced from the substrate; and

sending the sensor signal data from the electronics module to a data processing system, the electronics module moving separately from the data processing system.

53. (New) The method of claim 52 wherein sensor signal data is generated by the one or more sensors that are in the process environment while the electronics module and the data processing system are not in the process environment.

54. (New) The method of claim 53 wherein sensor signal data is generated by the one or more sensors while the electronics module transmits the sensor signal data to

the data processing system, the data processing system displaced from the electronics module.